

POND SEALING OR LINING - BENTONITE TREATMENT

(No.)
Code 521C

Natural Resources Conservation Service
Conservation Practice Standard

I. Definition

A liner for a pond or waste impoundment consisting of a compacted soil-bentonite mixture.

II. Purpose

To reduce seepage losses from ponds for water conservation and environmental protection.

III. Conditions Where Practice Applies

This practice applies where:

- Soils are suitable for treatment with bentonite.
- Ponds require treatment to reduce seepage rates.

This practice does not apply to the sealing of agricultural waste storage facilities.

IV. Federal, State, and Local Laws

Users of this standard should be aware of potentially applicable federal, state and local laws, rules, regulations or permit requirements governing pond sealing or lining. This standard does not contain the text of federal, state, or local laws.

V. Criteria

The following criteria apply to all purposes.

A. General Criteria

Structures to be lined shall meet all applicable NRCS Field Office Technical Guide (FOTG) Section IV, practice standards.

Bentonite treated soil liners shall be filter compatible with the natural foundation materials on which they are compacted according to National Engineering Handbook (NEH) Part 633, Chapter 26.

The minimum thickness of the finished compacted liner shall be 6 inches.

The bentonite shall be a sodium bentonite with a free swell of at least 22 milliliters as measured by ASTM Standard Test Method D 5890, unless laboratory tests using other bentonite types are used for design.

For protection against bentonite dust, personnel on site during bentonite application and mixing shall wear mask and goggles.

B. Liner Protection

The liner shall be protected as needed against desiccation cracking, the effects of water surface fluctuations, wave action, surface erosion, erosion around pipe inlets, animals, or items installed through the liner. Protective measures shall be designed into the system to protect the liner for these cases.

C. Application Rate

In the absence of laboratory tests or field performance data on soils similar to those to be treated, the minimum application of finely ground bentonite per 1-inch thickness of constructed liner shall be as follows:

Pervious Soil Description	Application rate (lb/ft ²)
Silts (ML, CL-ML)*	0.375
Silty Sands (SM, SC-SM, SP-SM)*	0.5
Clean Sands (SP, SW)*	0.625

*Unified Soil Classification System designation.

D. Liner Thickness

In the absence of more detailed testing and analyses, the minimum liner thickness shall be as follows:

Water Depth (feet)	Liner Thickness (inches)
8 or less	6
8.1 – 16	12
16.1 – 24	18
24.1 – 30	24

VI. Considerations

Additional recommendations relating to design that may enhance the use of, or avoid problems with, this practice but are not required to ensure its basic conservation functions are as follows:

- A. Flatten the slopes of ponds to facilitate compactive efforts during construction.
- B. A protective compacted soil cover should be considered for protecting the soil-bentonite liner.

VII. Plans and Specifications

Plans and specifications for bentonite treated soil liners for ponds shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. Plans and specifications shall include such drawings, specifications, material requirements, quantities, construction requirements, equipment requirements, and other documents as are necessary to describe the work to be done.

VIII. Operation and Maintenance

An Operation and Maintenance Plan shall be provided to, and reviewed with, the landowner.

Maintenance activities required for this practice consist of those operations necessary to prevent damaging the treated soil liner. This includes, but is not limited to excluding animals and equipment from the treated area, protection of the liner during initial filling, and repair of disturbed or eroded areas.

IX. References

USDA, NRCS National Engineering Handbook Part 633, Chapter 26.

USDA, NRCS Wisconsin Field Office Technical Guide, Section IV, Practice Standards and Specifications.